REMARKS/ARGUMENTS

Claims 1-23 are pending. Claims 1 and 17 have been amended.

Reconsideration of the application is respectfully requested for the following reasons.

In the Office Action, claims 1-23 were rejected under 35 U.S.C. §103(a) for being obvious in view of a combination formed among the Caldwell, Hamilton, and Tsuchiya patents. This rejection is respectfully traversed for the following reasons.

Claim 1, as currently amended, recites a compensator which adjusts a reference signal for a variation in temperature of a glass touch sensing circuit, compares an output signal from said switch proportional to the touch sensor signal with that of the adjusted reference signal, and outputs a wave-shaped signal in accordance with a compared result. As acknowledged by the Examiner, the Caldwell patent does not teach or suggest the compensator of claim 1. To make up for these deficiencies, the Hamilton patent was cited.

The Hamilton patent discloses a control circuit which compares a touch sensor signal to a reference signal. The reference signal is adjusted in response to power supply signal variations for comparison with a touch sensor signal (column 8, lines 62-65), not in response to a variation in temperature of a glass touch sensing circuit. The compensation circuit of Hamilton is therefore different from the compensator of claim 1.

The Tsuchiya patent discloses a system for controlling a heater of a thermal printhead for purposes of optimizing print quality. To perform this function, Tsuchiya uses a

compensation circuit which adjusts a reference signal. However, this compensation circuit is also different from the compensator of claim 1.

First, the compensator of the claimed invention "adjusts a reference signal for a variation in temperature of the glass touch sensing circuit." (Emphasis added). As shown in Fig. 5, the Tsuchiya compensator adjusts a reference signal RS between values RS1 and RS2. However, this reference signal adjustment is performed based on a temperature of its thermal printhead, not based on the temperature of a glass touch sensing circuit as recited in claim 1. More specifically, a reference signal generator portion of the Tsuchiya compensator is formed from CPU 41, data table 42a, and digital-to-analog converter 53. The CPU is responsive to a feedback temperature signal T and the data table stores information corresponding to one of two reference signals RS1 and RS2. In operation, the CPU switches its output from a first reference signal RS1 to a second reference signal RS2 when the temperature of the thermal head rises to a predetermined temperature or higher. At no time does the CPU 41 or any other portion of the Tsuchiya compensator adjust the reference signal output based on a temperature of a glass touch sensing circuit as performed by the claimed invention.

Second, claim 1 recites that the compensator "compares an output signal . . . proportional to the touch sensor signal with that of the adjusted reference signal." (Emphasis added). The Tsuchiya compensator performs a comparison based on the adjusted reference signal output from CPU 41. This comparison, however, involves comparing the adjusted reference signal to

the output of an RC charging-discharging circuit 49, and not to a signal proportional to a touch sensor signal as recited in claim 1. (See Fig. 5 where the output of the RC circuit (S) is compared with reference signal (RS1 or RS2) in monostable multivibrator (IC) 51, and also column 3, line 55 - column 4, line 22, and column 5, line 29-66). At no time is the adjusted reference signal compared with a signal proportional to a touch sensor signal as recited in claim 1.

In order to establish a *prima facie* case of obviousness of claim 1, the cited references must teach or suggest the compensator recited in this claim. The Caldwell, Tsuchiya, and Hamilton patents each individually fail to teach or suggest a compensator which (1) adjusts a reference signal for a variation in temperature of the glass touch sensing circuit and then (2) compares the temperature-adjusted reference signal to a signal proportional to a touch sensor signal. Absent these features, it is respectfully submitted that a Caldwell-Tsuchiya-Hamilton combination cannot render claim 1 or any of its dependent claims obvious.

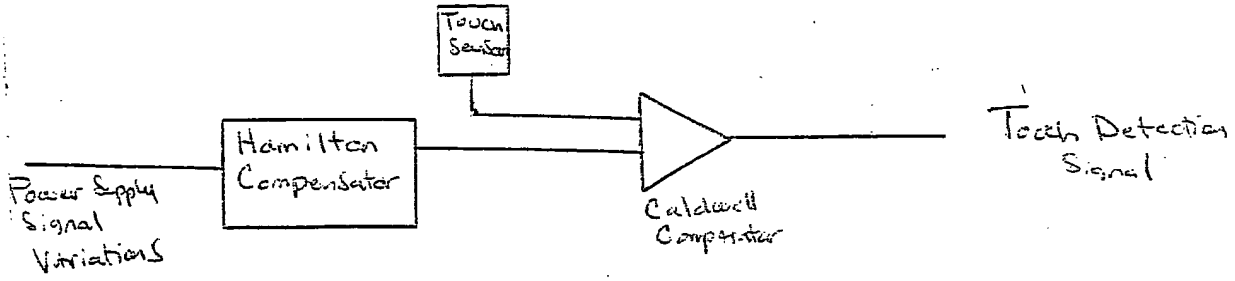
In the Office Action, the Examiner took the position that the aforementioned patents may be combined to achieve the claimed invention. Two such combinations appeared to have been proposed.

First Proposed Combination

The Examiner first appeared to allege that it would have been obvious to modify the Caldwell touch sensing circuit to include the reference-signal compensation circuit of Hamilton, and then to modify the Hamilton compensation circuit to adjust a reference signal not based on

power supply signal variations but based on temperature variations of a touch sensor circuit. In order to properly combine these references in this manner and thus to satisfy the second requirement of establishing a *prima facie* case of obviousness, there must be some teaching or suggestion to do so.

The Caldwell patent discloses a touch sensing circuit which generates a touch detection signal by comparing a touch sensor signal to a fixed reference signal. The Hamilton patent discloses comparing a touch sensor signal to a reference signal that is adjusted based on power supply signal variations. (See the following illustration).

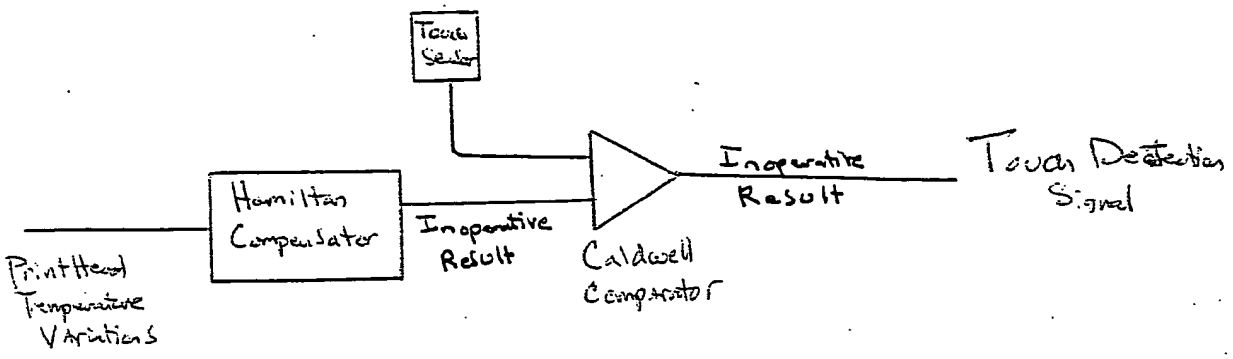


Combining the Caldwell and Hamilton patents, as above, produces a touch sensing circuit which compares a touch sensor signal to a reference signal that is adjusted based on power supply signal variations, not based on variations in temperature of the touch sensing circuit as recited in claim 1. Thus, even if a teaching or suggestion was in existence at the time the claimed invention was made to combine Caldwell and Hamilton, that combination would not include

the compensator of claim 1, i.e., one which adjusts a reference signal based on temperature variations of the touch sensing circuit and then compares the temperature-adjusted reference signal to a touch sensor signal.

The Tsuchiya patent discloses a control circuit which adjusts the duration a heater for a thermal printhead is turned on based on a temperature of the printhead. This is performed by adjusting a reference signal based on variations in the printhead temperature. Neither the Caldwell, Hamilton, or Tsuchiya patents nor any other reference of record teaches or suggests that a reference signal generator of the type included in a Caldwell-Hamilton combination can be modified by Tsuchiya to produce a compensation circuit that (1) adjusts a reference signal based on temperature variations in a touch sensing circuit and then (2) compares that temperature-adjusted reference signal to a touch sensor signal.

And even if such a teaching or suggestion existed, the resulting combination would not form the claimed invention. As noted above, a Caldwell-Hamilton combination produces a touch sensing circuit with a compensation circuit that compares a touch sensor signal to a reference signal adjusted for power supply variations. Modifying this combination with Tsuchiya would cause the Hamilton compensation circuit to (1) adjust the reference signal based on temperature variations of a thermal printhead and then (1) compare this adjusted signal to a touch sensor signal. (See illustration below).



Such a modification would produce a device which is inoperative because the Hamilton compensator would attempt to adjustment a touch sensing circuit based on temperature variations of a thermal printhead, which is not even included in a Caldwell-Hamilton combination. As noted by the MPEP §2143.01, a combination which produces an inoperable device is impermissible for purposes of rejecting a claim under 35 U.S.C. §103(a).

Second Proposed Combination

What the Examiner appears to have proposed in the alternative is to include the Tsuchiya compensation circuit in Caldwell and then modify this circuit to adjust a reference signal based on the disclosures in Hamilton.

To properly make this combination, there must be some teaching or suggestion to support modifying the Tsuchiya compensation circuit so that it adjusts a reference signal based on temperature variations of a touching sensing circuit, instead of a thermal printhead. No teaching or suggestion exists on the record that would support modifying the Tsuchiya compensation circuit in this manner, i.e., that would support modifying a circuit which adjusts

a reference signal used to control a printhead heater to perform this function based on temperature variations of a touch sensing circuit.

Moreover, modifying the Tsuchiya compensation circuit in the manner proposed by the Examiner would render the resulting device completely inoperative. The Tsuchiya compensation circuit operates by receiving a feedback signal indicative of a printhead temperature. CPU 41 then retrieves a one of two reference signals RS1 and RS2 from a table, converts this signal into a digital signal, and then inputs this signal to a circuit which generates a duration signal T for controlling the on-time of a printhead heater. Because the operational temperatures of a printhead tend to be far greater than the temperature of the touch sensing circuit, any modification that would result in inputting a temperature detection signal for a touch sensing circuit into the printhead compensation circuit of Tsuchiya would render the device completely inoperative. For example, any temperature signal fed back from a touching sensing circuit would never reach a level high enough to cause CPU 41 to switch to the higher reference signal RS2. As a result, RS1 would always be output, thereby causing the Tsuchiya circuit to malfunction.

Also, the signal output from the Tsuchiya compensation circuit is a signal T which indicates the duration of a heater on-time. Such a signal has no relevance whatsoever in a circuit which generates a touch detection signal, thereby further rendering the combination inoperative.

For the foregoing reasons, it is respectfully submitted that the second combination of the Caldwell, Tsuchiya, and Hamilton patents proposed by the Examiner is improper for purposes of rejecting claim 1 under 35 U.S.C. §103(a).

Non-Analogous Art

Applicant further submits that a Caldwell-Tsuchiya-Hamilton combination would be improper on grounds that Tsuchiya constitutes **non-analogous art**. To qualify as analogous art, one of two requirements must be satisfied. The Tsuchiya patent must derive from the same field of endeavor, or if not from the same field of endeavor the Tsuchiya patent must be reasonably pertinent to the particular problem with which the inventor is involved. *In re Clay*, 23 USPQ.2d 1058, 1060 (Fed. Cir. 1992).

First Requirement. The Tsuchiya patent discloses a compensation circuit for controlling heaters of a printhead. This patent does not address in any way touch sensing circuits. Accordingly, it submitted that Tsuchiya does not derive from the same field of endeavor as the claimed invention.

Second Requirement. The Tsuchiya patent is also not reasonably pertinent to the particular problem with which the inventor of the claimed invention is involved. The claimed invention focuses on producing a touch sensing circuit which maintains a desired sensitivity to detecting touch in spite of changes in temperature of the circuit. More specifically, the Inventor has noticed that as temperature increases, the duration of a touch signal increases but the

opposite is the case as temperature decreases. As a result, inconsistent sensitivity to touch detection results and the invention overcomes this problem through its compensation circuit.

The Tsuchiya patent, on the other hand, attempts to solve the problem of improving the quality of thermal printheads, specifically by compensating for fluctuations in temperature that cause fluctuations in printing of characters on paper. See column 1, lines 14-27, and column 1, line 59 to column 2, line 42. Improving the quality of print from a thermal printhead is not reasonably pertinent to the problem of achieving a consistent touch detection sensitivity of a touch sensing circuit.

Because neither requirement of the *Clay* test has been satisfied, it is respectfully submitted that the Tsuchiya patent does not constitute analogous art and thus is improper for purposes of rejecting the claims in the present application under 35 U.S.C. §103(a). Withdrawal of the rejection of claim 1 and its dependent claims is therefore respectfully requested.

Claim 10 recites a touch sensing system which includes a controller which processes a touch sensor signal "based on a variation in temperature to generate a touch detection signal." The cited combination of references does not teach or suggest such a controller. As previously noted, Caldwell does not have a compensation circuit and while Hamilton does its compensation circuit adjusts a reference signal based on power supply signal variations. As for Tsuchiya, this patent discloses a compensation circuit which adjusts a reference signal based on temperature variations of a thermal printhead. Since a touch sensing circuit formed by a Caldwell-Hamilton

combination does not have a thermal printhead, it is clear that including the Tsuchiya compensation circuit in this combination would render the result completely inoperative since the Tsuchiya circuit operates based on thermal printhead temperature measurements. Moreover, one of ordinary skill in the art would not look to the Tsuchiya patent to solve the problem with which the claimed invention is involved because it derives from a non-analogous art. Finally, and most importantly, no teaching or suggestion exists on the record to modify a touch sensing circuit formed by a Caldwell-Hamilton combination to include a thermal printhead compensation circuit.

For at least these reasons, it is respectfully submitted that claim 10 is non-obvious and thus patentable over the cited combination.

Claims 11-17 depend from claim 10 and are distinguishable on separate grounds.

Claim 11 recites that the controller processes the touch sensor signal "in a manner which achieves a constant level of touch detection sensitivity in spite of temperature variations." An example of this constant level touch detection sensitivity may be understood by comparing a conventional case to Figure 4 of Applicant's drawings. In the conventional case, no compensator circuit is included. Thus, as temperature varies the switching signal which controls the sensitivity of touch detection varies, which causes inconsistent performance. (See page 7, line 16 - page 8, line 2 of the specification). This problem may also understood with reference to Figure 2 where the downward spikes reflect inconsistent operation which is not compensated for.

Figure 4 shows what occurs when the claimed invention is applied. When the claimed controller is included, the reference voltage V_{ref} allows the touch detection sensitivity to remain at a constant level regardless of the magnitude of the downward spikes (i.e., the switching signal magnitude). The system of the present invention therefore demonstrates improved sensitivity performance through the controller of the claimed invention.

None of the references of record teach or suggest a controller of this type, whether those references are taken alone or in combination. The Hamilton reference signal compensation circuit, for example, discloses adjusting a reference signal based on power supply variations, not based on any variations that may take place as a result of different operational temperatures. And while the Tsuchiya patent adjusts a reference signal based on temperature differences, the adjustment is made not based on the temperature of the touch sensing system but rather on the temperature of a thermal printhead. For at least these reasons, it is respectfully submitted that claim 11 is patentably distinguishable from a Caldwell-Hamilton-Tsuchiya combination.

Claim 12 recites a compensator which compensates for "variations in the switch signal based on temperature variation." (Emphasis added). None of the references of record individually or collectively teach or suggest a compensator of this type.

Claim 14 recites a "level-controller which controls a level of the reference signal based on temperature variation," and claim 15 recites that the level-controller "varies the level of the reference signal to coincide with changes in the switch signal that result from variation in

temperature." (Emphasis added). Once again, none of the references of record individually or collectively teach or suggest a compensator of this type.

Claim 18 recites a controller which "compensates for variations in a turning-on period of the switch in order to generate a touch detection signal." These features are apparent, for example, from Figure 4. Here, it is shown that the switching signal (e.g., from transistor Q101 in Figure 3) used to generate a touch detection signal varies based on whether a user touches a touch sensor and/or a length of time that the user touch occurs. The controller of claim 18 is provided to overcome variations in the turning-on period of the switch and thus to produce a more consistent touch detection sensitivity. None of the cited references include such a controller.

The Tsuchiya circuit includes a switch (switching element 53 in Fig. 4), however the compensation circuit disclosed in this patent is not used to compensate for variations in this switch. Rather, this switch is used to generate one of two levels of a reference signal (RS1 or RS2) depending upon variations in thermal printhead temperature. Tsuchiya does not teach or suggest that CPU 41, monostable multivibrator 51 or any other feature of its compensation circuit compensates for variations in switching element 53 or any other switch disclosed in this patent.

The Hamilton circuit discloses a circuit which compensates for power supply signal variations, not for variations in a switching signal used to generate a touch detection signal.

Moreover, Hamilton does not even use a switching signal to generate its touch detection signal. As shown in Figure 1, the Hamilton circuit includes a comparator 52 which compares a signal from a touch sensor 30 to a reference signal from reference detector 20. Neither this figure nor any other portion of Hamilton teaches or suggest placing a switch between touch sensor 30 and comparator 52 for purposes of generating a touch detection signal. (The only element between sensor 30 and comparator 52 is a resistor 58). And while other portions of the Hamilton circuit includes elements that may function as switches (e.g., diodes 38 and 62), the Hamilton compensation circuit does not compensate for variations in their output signals.

For at least the foregoing reasons, it is respectfully submitted that claim 18 and its dependent claims are allowable over a Caldwell-Tsuchiya-Hamilton combination.

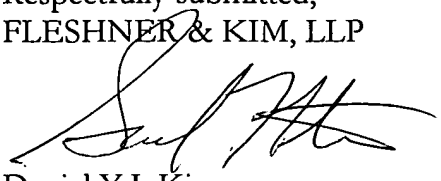
Claims 19-23 recite additional features which allow the controller of claim 18 to compensate for variations in a switching signal used to generate a touch detection signal. None of these features are taught or suggested by the references of record, whether taken alone or in combination.

In view of the foregoing amendments and remarks, it is respectfully submitted that the application is in condition for allowance. Favorable consideration and prompt allowance of the application is respectfully requested.

To the extent necessary, Applicants petition for an extension of time under 37 C.F.R. §1.136. Please charge any shortage in fees due in connection with this application, including

extension of time fees, to Deposit Account No. 16-0607 (Attorney Docket No. IK-011) and credit any excess fees to the same Deposit Account.

Respectfully submitted,
FLESHNER & KIM, LLP



Daniel Y.J. Kim
Registration No. 36,186
Samuel W. Ntiros
Registration No. 39,318

P.O. Box 221200
Chantilly, Virginia 20153-1200
703 502-9440 DYK:SWN/kam
Date: August 20, 2003

Please direct all correspondence to Customer Number 34610